Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Geologists now regard the slates of Taconic Mt. and the limestone, also, as of Lower Silurian age, but later than the Potsdam sandstone. Logan refers them to the Quebec group. Whatever the period of the slates, or slates and associated limestones, to that period properly pertains the term *Taconic.*

THE STONE AGE IN NEW JERSEY.

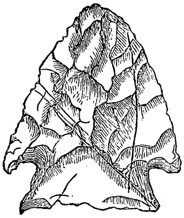
[Concluded from March Number, p. 160.]

BY CHARLES G. ABBOTT, M.D.

ARROWHEADS.—No one class of relics of a savage race presents at once so great a variety of shapes, sizes and materials; and the former presence of "Indians," is more generally known to the people at large through the frequent occurrence of these arrowpoints, than by means of any other style of weapon or implement; not even excepting the cumbrous axes that not unfrequently go to make up the piles of cobblestones that accumulate in field corners or by the roadside. One of the largest axes we have seen, which we have since sent to Sir John Lubbock, was found supporting a section of worm-fence, where it had been lying thus for at least a century.

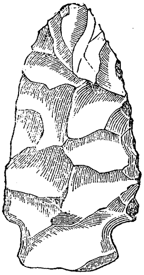
These arrowheads, which are found scattered over every portion of the state, are, very naturally, much more numerous in some localities than in others; and as no one style appears to be peculiar to any one locality, a good series from even a very limited extent of country will usually represent the shapes and sizes found over the whole state. Any attempt at classification will prove a desperate undertaking, as no well marked style has yet been found which has not been duplicated by a second, varying a mere trace, and these slight variations go on without a break until the two extremes of shape are found to be connected by an unbroken chain of closely allied varieties. The Darwinism of arrowheads needs no supplemental theory to make it good, nor are there shapes that cannot be explained by a somewhat similar and more primitive one. Prof. Nilsson ("Stone Age in Scandinavia," Eng. ed., page 43) says "we may divide arrowheads into such as have, and such as have not, a tang or projection for insertion into the shaft." Referring to Lubbock, in "Prehistoric Times," we find him, on page 98, quoting Sir W. R. Wilde, who divides the arrowheads into five varieties. Further reference to the two works quoted above shows us, in the drawings, that whatever they have illustrated from the north of Europe or from Terra del Fuego is also to be met with here in New Jersey. We propose, in figuring the various shapes that we have so far met with, to follow Prof. Nilsson in separating the specimens into those with and without tangs or projections; but we cannot undertake to follow him farther, where he specializes certain forms as harpoonpoints, etc., etc. That some were used as spears, as weapons in battle, and others as hunting spears, or for fishing, *i. e.*, harpoonpoints, is probably beyond question; but that they were not or could not have been used as arrowpoints is difficult to disprove; and while we propose to speak of certain specimens in order, as to their probable use, we will call them all "arrowheads." Ethnologists can reject the text if they see fit, but we trust the illustrations will be interesting to those who desire to study them carefully, and with whom specimens are scarce. Arrowheads with tangs or projections for insertion into the shaft are somewhat less abundant than those without the projection; but they are of far greater variety of outline, and vary more in their size, running into spear or harpoon-

Fig. 31.



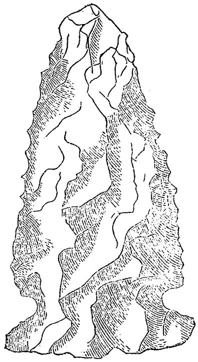
Natural size.

Fig. 32.



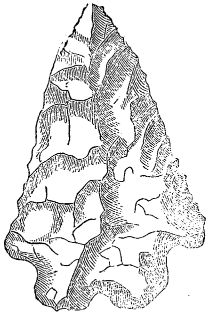
Natural size.

Fig. 33.



Natural size.

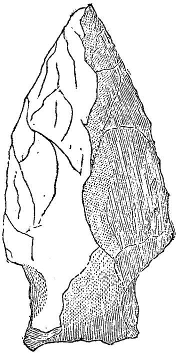
Fig. 34.



Natural size.

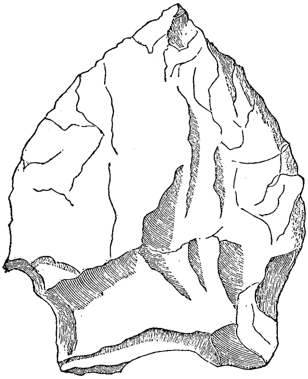
points. The most common shape of tanged arrowpoint is the small jasper specimen given in Figure 31. Unlike some forms, there can be no question as to the use to which this specimen was most admirably adapted as that of an arrowhead. The sharp point, well defined edges and deeply notched base, combine to render it at once secure in its attachment to the shaft, and efficacious as a weapon when discharged from a bow.

Fig. 35.



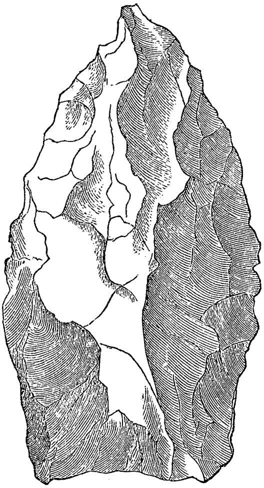
Natural size.

Fig. 36.



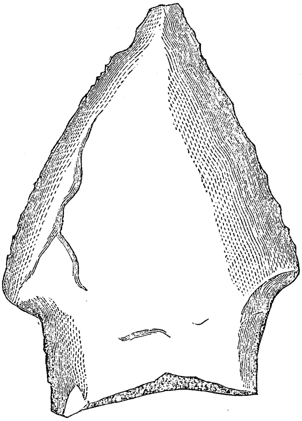
Natural size.

Fig. 37.



Natural size.

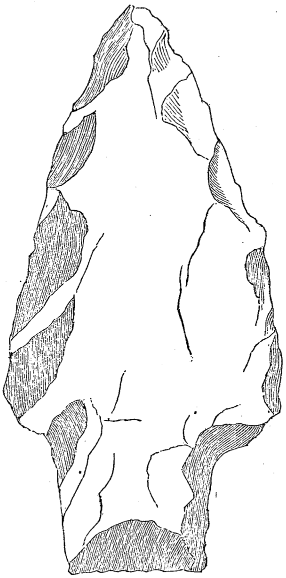
Fig. 38.



Natural size.

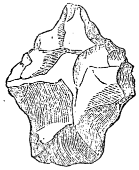
Of this pattern there is a remarkable uniformity in size, and the vast majority of specimens found are of jasper. A second form with a notched base is represented by Figures 32 and 33. Like the above, this form does not vary much in size, and is usually of jasper, but by no means invariably of that mineral. Slate was considerably used, but accuracy and general elegance of outline were not secured in using that material. We think that there can be no question as to these being used exclusively as arrowheads, but the same shape of greater dimensions would have been efficacious as harpoonpoints. The specimen (Fig. 33), it will be noticed, has serrated edges. This is a not uncommon feature of many of the smaller specimens, but generally these serrated specimens are broken. A careful study of over a hundred examples has explained this, we think. In comparison with the same type with smooth edges, we find that they are invariably much thinner. To secure the serrated edge, it was probably necessary to make them so; and of course these thin specimens were more frequently broken in the manufacture and more liable to injury in the daily wear and tear to which they were subjected. A third form of notched arrowheads with a projecting base is seen in that figured in the illustration (Fig. 34). In general appearance it is much like the preceding, but the object of the notch in the centre of the base below does not appear. The specimen is of a black, slaty stone, thin, with the sides indistinctly serrated. We have met with no similar figure in any work on the subject of stone weapons. In New Jersey, at least about Trenton, they are found occasionally, a dozen or more examples having been seen by

Fig. 39.



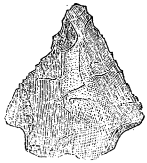
Natural size.

Fig. 40.



Natural size.

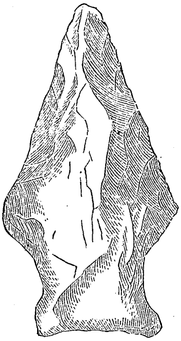
Fig. 41.



Natural size.

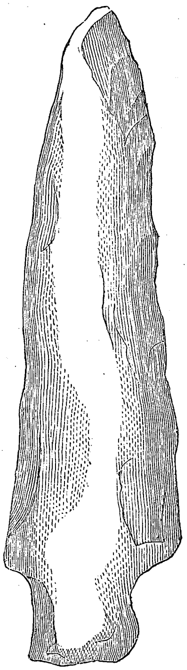
the writer. Of these specimens there was no variation in size, mineral, or peculiarity of base. A fourth form, and a very common one, is that given in the five illustrations (Figs. 35, 36, 37, 38, 39). In these examples we see the one common character of an unnotched base, and that the blade of the arrow is considerably wider, the width increasing abruptly in three specimens and less so in the other two. The specimen (Fig. 35) is of jasper, beautifully wrought, and very accurately bevelled from the centre to the edges, which are smooth. The length, one inch and three-quarters, decides its use, that of an arrowhead only. The specimen that approaches this most nearly is that given in Fig. 39. This is made of sandstone and is one and three-quarters times as large as the former. It is well made, considering the material, and if used as an arrowpoint must have required a very heavy shaft and powerful bow. A series of specimens, figured by Prof. Nilsson as coming from Mexico, Ireland, and Terra del Fuego, and all bearing considerable resemblance to the illustration we have given, are called, one an "arrowhead," another a "harpoonpoint." We will leave it to be decided in future, if it can be, to which class this specimen really belongs. Fig. 38 is a modification of the preceding, about two-thirds the length, and of similar mineral. It is not as frequently found as the other, but is not a rare form. It appears to us to be better adapted to arrow purposes, but is nevertheless well adapted to use with a stouter shaft than an arrow and wielded as a javelin. Figs. 36, 37, 38 and 39 are further illustrations of this type of based arrowhead, all of which have some peculiarity of their own. Fig. 40 is the natural size of a form that is occasionally found. It does not appear ever to have been more acutely pointed or

Fig. 42.



Natural size.

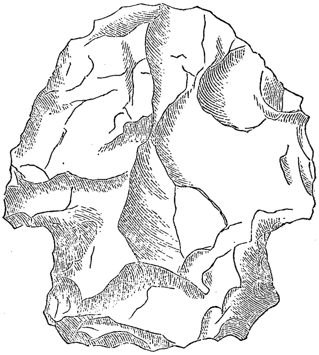
Fig. 43.



Natural size.

sharper sided than now, and is an innocent looking affair. It is as difficult to conceive of the use of so small a specimen as it is to conjecture how the larger ones were utilized. Yet they occur in sufficient numbers to show that they had an especial adaptation. We cannot look upon them as toys for prehistoric infants; there is too much work about them for that. The following figure (41) is of similar dimensions, but appears to us better outlined for an arrowhead. On a slender reed, if discharged with force, it would unquestionably bring down a large bird or squirrel. A much larger and very accurately outlined style of arrowhead is that illustrated by Fig. 42. These are never well finished except in outline, are of slate and rough and uneven on their broad surfaces. This occurs from the peculiarities of the mineral. It is not an abundant form. Beautiful quartz arrows of nearly the same general shape as the preceding, but much more finished specimens, are frequently found. Quartz seems to have been a very favorite mineral with the ancient arrow makers, and almost every shape we have found in other minerals is reproduced in this, except that they are almost always small, and so were used only as arrowheads. Figure 43 is a prevailing style of arrowhead, three and a half inches long, and one inch in breadth at the base of the blade. It is of a slaty stone, and from great age or other causes has lost its acute point and well sharpened edges. The base is similar to that of the slate arrowhead above described; and appears to be sufficiently large to render a secure attachment to a shaft feasible. If originally as sharp at the point and along the edges as are some jasper specimens, it was then capable of doing considerable execution. They are quite abundant, but their shape has rendered them very liable to be broken, especially on stony ground; and we therefore find the majority of this pattern in a more or less fragmentary condition. Figure 44 is a style of arrowhead that presents one marked peculiarity. It has no point. Otherwise agreeing very well with Fig. 36, it has that difference.

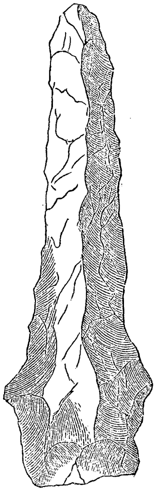
Fig. 44.



Natural size.

Originally it had a point; of this we feel confident, but as this is the most fragile portion of an arrowhead, of course it is the most likely to be broken and such has here been the case; but the weapon was still deemed worthy of preservation, and has therefore been chipped to an edge, where the fracture took place. Whether used as an arrowhead afterwards or not, may perhaps be questioned. The specimen as it now is certainly bears much resemblance to certain chipped jaspers, to which we will call attention hereafter. They are of frequent occurrence and vary very much in size, as though all sizes of arrowpoints were occasionally thus repaired, even the pigmy specimens that we have already figured and described.

Fig. 45.

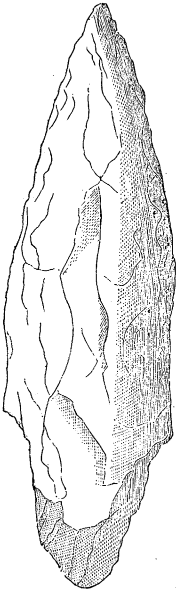


Natural size.

An interesting and quite abundant form of arrowhead is that given in Fig. 45. They occur of every variety of mineral that has yet been met with by us, in the shape of "relics," but the very great majority are in a fragmentary condition, usually only the base and a small portion of the shaft remaining. The specimen figured is of jasper and is remarkably perfect. The point is somewhat blunt, but the edges are pretty sharp. The slender stem is as thick as broad, and there is but little tapering from the quadrangular base to the point. In June, 1871, we forwarded three perfect and several broken specimens of this form to Sir John Lubbock, who has since written us—"As to the long pointed forms of which there are three nearly perfect specimens, besides some fragments. . . . . . I am disposed to regard them as arrowheads, but would only express this opinion under reserve." There is every reason to believe that the first owners of these stone implements were moderately careful of them, and no little skill was required to work them successfully out of the materials they used. Taking this into consideration, we believe it is safest to give to a specimen that name which expresses the use involving the least risk. Now such a specimen as this is assuredly very easily broken, although this has stood safely the exposure of several centuries. To be placed in the end of a spear handle, and used as such, to thrust at fish, etc., would involve more danger of its being broken, than if placed at the end of a slender shaft it was shot into the side of some animal or bird, and so secured unharmed for future use. Theorizing in this way, we believe, without reserve, that this form was exclusively used as arrowheads.

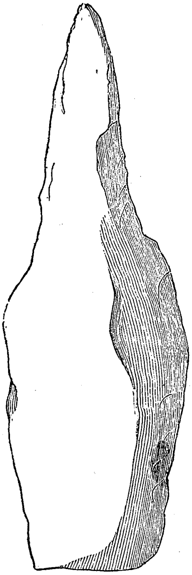
A decided variation from the square tanged arrowheads, is illustrated by Fig. 46 which represents a large arrowhead, admirably chipped from flint, or a bluish gray mineral resembling it. While we have occasionally met with specimens like it in our own neighborhood, it is really a "sea-shore" form and was probably largely used in shooting or harpooning fish. Along the shore of Delaware Bay and in Delaware, near the break-water, and in similar localities, it is the prevailing form. Three inches long, and but seven-eighths in width, it has a very acute point, and would offer but little resistance to the water. The tang is so shaped as to permit of its being securely fastened to a shaft, and yet easily removed. The specimen is beautifully reproduced in every feature, but length, in quartz specimens. In quartz, this style is abundant, and its size shows it was used only as an arrowhead, in ordinary upland hunting.

Fig. 46.



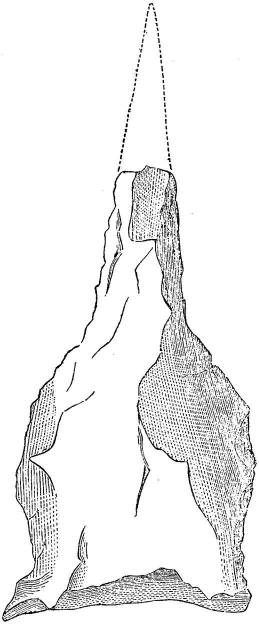
Natural size.

Fig. 47.



Natural size.

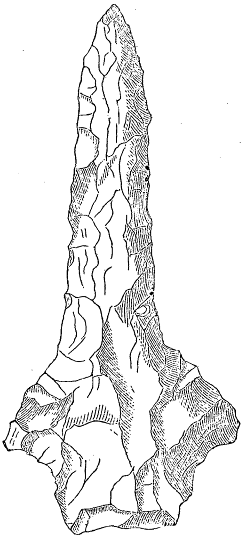
Fig. 48.



Natural size.

Figures 47 and 48 represent two allied forms of slender stemmed arrowheads, allied to each other and to the preceding two varieties. They are of slate, moderately well made and of a length that suggests the spearhead as well as arrow. They are, neither, as frequently met with as the preceding forms, with prolonged stems; but cannot be called rare forms. It has been suggested by an esteemed contributor to the NATURALIST, that these broadly based forms were used as target arrows, the stem only perforating the target, and so they were not lost. But we do not believe so much work would be spent upon arrowheads, for such a purpose only, and opine the prehistoric infants learned to shoot by other methods. Indeed, such must have been the mode of life at this time, that it was a matter of killing or starving, and under such circumstances man's capabilities to climb, run or shoot correctly are very quickly and thoroughly developed. Indeed, correctness of aim may have been inherited then, as well as faculties we now possess are inherited by us.

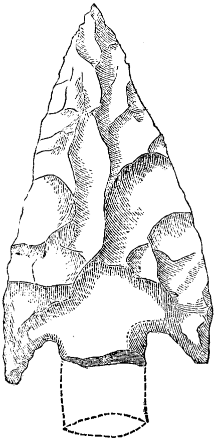
Fig. 49.



Natural size.

Figure 49 represents a variety of arrowhead, of which we have only seen the one specimen. Beautifully wrought in dull green jasper, it has the slender stem of the immediately preceding forms, with barb-like projections immediately above the base. It is most unfortunately broken, so as to render it impossible to determine all its features. Probably, the barbs were not repeated lower down, and the specimen was broken very near the original termination. Unlike the other elongated-stemmed specimens, this is thin and flat, and the whole aspect is that of a delicate, easily broken form. This fact makes us doubtful about its use as an harpoonhead; although it would be most admirably adapted for such use had the base been sufficiently prolonged to permit the side projections to operate as barbs. We do not find in Nilsson's work on the "Stone Age in Scandinavia" any harpoon-point that resembles this, which more naturally suggests that use, than any of the specimens he figures as having been so used. It seems incredible that a form so easily destroyed as this should finally have been picked up in its present condition, in a very stony field that for a century has been under uninterrupted cultivation. We have to refer to one more form of arrowhead with projecting base. For delicacy of finish and beauty of outline it is unequalled. As will be seen by the illustration (Fig. 50), the base is broken off, but we can feel confident that it was sufficiently prolonged to enable the very accurately finished barbs to be effective. We imagine the prehistoric hunter who supported a quiver of arrows with such heads as these did not waste them on small game. However great the skill of an arrow maker, to turn out such work was undoubtedly a tedious operation.

Fig. 50.



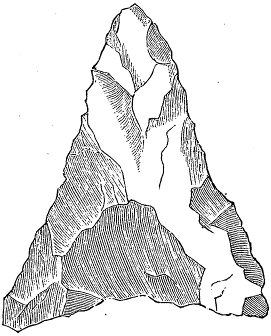
Natural size.

The second great division of arrowheads, which furnishes less variety in shape, is simplified in its study by the greater uniformity of size, and there is proof from this alone that their use was for shooting purposes only. We have not yet collected a single plainly based specimen, *i. e.* without a tang, that was too large to seem fitted for arrow purposes, or by its size suggested any other use. This class may be further subdivided into such as have straight, convex or concave bases. The largest number belong to the last series; the next in number to the second series and the fewest specimens are those with straight bases.

These remarks on relative abundance are liable to be upset at almost any time. As in the case of axes, so we occasionally meet with " deposits" of arrowheads;" the storehouse, as it were, of a tribe or perhaps of an arrow maker; and as in such cases there is always a predominance of one form, so it may be that other collectors have a majority of straight based specimens from their locality; or a future "find," will change the relative proportions which we have given. No predominance of any one form, however, marks the site of the dwelling and workshop of the arrow maker. In some cases the variety is wonderful; and the broken, unfinished specimens suggest that variety was continually aimed at by the "flint chipper." We have seen several forms at such a locality, that we have not yet met with in a finished state.

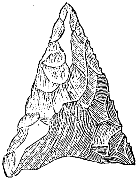
These sites of skilled arrow-makers' workshops were usually on projecting points or bluffs overlooking a broad expanse of country; and when once visited, are known immediately by the countless numbers of thin, splintery flakes that cover the whole ground. One such place in particular had evidently been so occupied for many generations, or by a score of arrow makers during their lifetime, considering the vast amount of chips and refuse material on the ground. It was a paradise for the mineralogist, for all our mineral productions, suitable for chipping, seemed to be there in abundance. After a rain, when the chips were free from dust, the many colored jaspers presented a beautiful appearance. Isolated specimens of minerals, available for arrow making, are frequently found in the fields, that do not belong there according to the given "localities" of mineralogists. One of the finest agates we have ever seen, was a partially chipped mass found just beyond the town limits of Trenton, N. J.

Fig. 51.



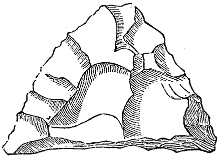
Natural size.

Fig. 52.



Natural size.

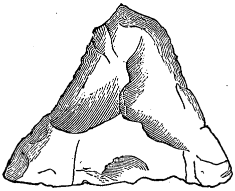
Fig. 53.



Natural size.

Triangular arrowheads, with concave bases, are very abundant and present some little variations in detail. Figure 51 is a beautiful specimen of one of these varieties, and is of a shape and size that we frequently meet with. They are mostly of black quartzose stone, or cut from a hard piece of slate. The specimen figured is of yellow jasper, with veins of white quartz running through it. A second illustration of this form, giving about the minimum size, is that of Fig. 52. It is one of the handsomest specimens that we have ever seen. It is cut from a greenish gray jasper, and remains in its perfect condition. Like the preceding this size and form also is mostly represented by black specimens cut from hard stone, but one that is much more brittle than is this many colored jasper, of which so many of our arrowheads have been made. A third variety of this class of arrowheads, is given in figure 53. The base is so slightly curved as to make one doubt where to place the specimen. It is very nearly an equilateral triangle, but is particularly to be noticed, in that it has not been made with a well defined point; or if so originally, has since been sharpened down to a curved edge, and again used as an arrowpoint. Such arrowheads must have been shot with tremendous force to render them effective, for the cutting edge is never sharp as points that have been chipped; and as they now are, these curved topped specimens seem better adapted to crush than to penetrate. The specimen described is cut from yellow jasper or a mineral approaching it. It has not the gloss that jasper usually has. A variation of the form immediately preceding this, is given in Fig. 54, of slate, but well cut: this style is very sparingly met with. The peculiarity, as will be seen at a glance, consists in the manner in which the point has been chipped. A single specimen of this style would probably excite no comment. The peculiarity would be considered as resulting from a chance blow of the arrow maker. This however is proved not to be so from the fact that a score or more have been gathered, each, in size and mineral, the fac-simile of the others. It is probable that one maker may have fashioned all that we have found, and the style originated and died with him.

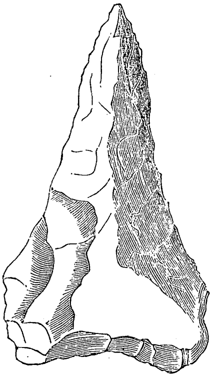
Fig. 54.



Natural size.

A handsome form is represented in Fig. 55. It has the appearance at first glance of having been barbed as in Fig. 50 but the carefully chipped sides of the base induce us to believe that it is now in its original condition. With a shaft much narrower than the base of the specimen, this would be one of the most effective arrowpoints that we have figured. It is not a common variety in this neighborhood (Trenton, N. J.) but we have met with quite a number precisely of this pattern in the collections of others. They are usually of jasper; very smoothly chipped and are thin and easily broken. The fragments of this form are much more abundant than of many others.

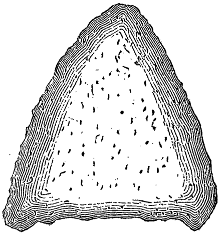
Fig. 55.



Natural size.

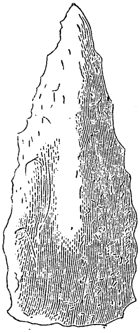
Straight based specimens, as given in Figs. 56, 57, 58 and 59, are very frequently picked up where arrowheads are found at all. Used wholly in bow and arrow hunting, they are scattered pretty much every where. Falling by chance, hither and thither when the hunter failed to strike the game, they have been left for anthropological entertainment until our time, to be gazed at and their workmanship admired. The most usual form of this class is the plain triangle (Fig. 56). Of white or rose quartz or of black slaty or quartzose stone, they present, in the field, so much of a contrast to surrounding pebbles, as to be readily detected and picked up. This same even edged triangle varies considerably in breadth and length, the extreme in length being the quartz arrowpoint (Fig. 57). Between these two extremes, all the variations of relative length and breadth exist. This latter figure is perhaps a little more abundant than the preceding, and when evenly cut from a piece of veined or rose quartz is a very beautiful specimen of ancient stone work. The minimum size of equilateral triangular arrowheads of this pattern is shown in Fig. 58. This specimen is cut from a piece of dark chocolate jasper. Its size is usually found cut from black stone, and is generally of equally good workmanship. Like the more slender, green jasper specimen (Fig. 52), it must have been used only in securing small birds and mammals. A rare form of this class is the pretty specimen (Fig. 59). This is cut from a piece of greenish jasper, and while very peculiarly outlined, still bears some resemblance to the specimen already described (Fig. 55). The base also approaches that of the beautiful specimen, Fig. 45. Indeed, we were at first inclined to believe that that form was intended, but the narrow

Fig. 56.



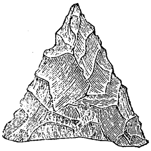
Natural size.

Fig. 57.



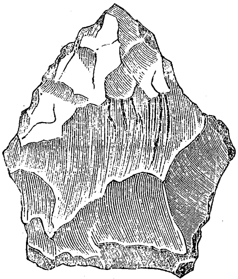
Natural size.

Fig. 58.



Natural size.

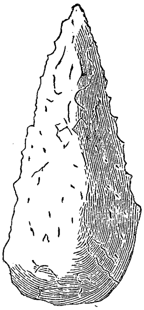
Fig. 59.



Natural size.

stem being broken, it was finished up as we now see it. Lately we have seen several stems like it, but smaller, and as they are all thinner than the stemmed arrowheads, and show nothing of the well marked central ridge that they have, we believe that this style was designed, just as it is, but probably for some especial purpose—some particular game. They are about as scarce as any one variety, so far as our experience in collecting goes.

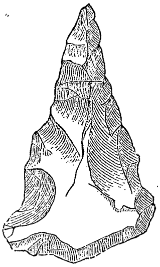
Fig. 60.



Natural size.

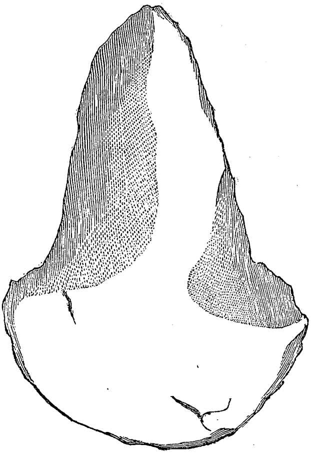
The leaf-shaped arrowhead and its modifications, and those arrowheads with convex bases, are well represented in numbers, in the usual day's "find" in any neighborhood good for collecting. The plain leaf-shaped form (Fig. 60) is the prevailing variety, and the difference in size in a large series is but very slight. They are generally chipped from white quartz, and exhibit careful workmanship. The point and edges are invariably sharp; the indestructible nature of the mineral having helped to preserve them until this time. When first lost, who can say? A variety of this form, verging into the plain triangle is shown in Fig. 61. The plainly notched base shows how it was attached to a shaft, which does not appear so readily in the case of the preceding form. The present form is but seldom met with. So far they have varied but very little in size or material (jasper) from the one figured. Another and peculiar form is shown in Fig. 62. This specimen is of mottled slate, and is larger than the general run of leaf-shaped arrow heads, even of that given in Fig. 60. Its size indeed suggests the spear, and we are somewhat inclined to think that an arrow with such a head would be a very uncertain weapon, in the hands of howsoever good a marksman.

Fig. 61.



Natural size.

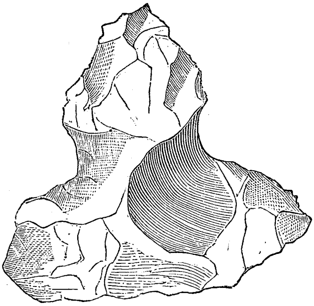
Fig. 62.



Natural size.

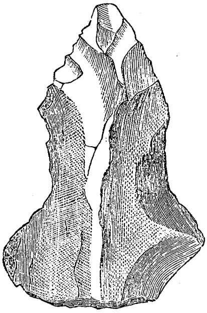
In continuing the subject of arrowheads, we have a few words to say concerning certain forms that have more or less affinity to those already figured, but have peculiarities of their own, worthy of some special comment. The first of these specimens is illustrated by figures 63 and 64. While bearing some resemblance to each other, they are not both fragments, as they appear; Figure 63 being evidently a finished specimen, as the base is chipped and not broken. This fact renders it probable that the other (Fig. 64) has had a chipped base of similar form, which has since been broken. Both have had, and one still has, a very good point. They are thick and heavy; strong enough for harpooning, but are not long enough to penetrate sufficiently deeply to kill, say a sturgeon or gar. When these were in use, our pickerel may have been much larger than now, and in that case they would have been effective in spearing them, but are too cumbrous for the slender Esoces that are now found in our waters. In works on prehistoric remains, we do not find this form figured or described in either stone, bone, or bronze. Unless one or two fragments that we have belong to this form, we have never met with any other specimens than the two here figured. The specimen given in Fig. 63 is of jasper and heavier in all its details than the other which is of lighter material and more smoothly chipped throughout.

Fig. 63.



Natural size.

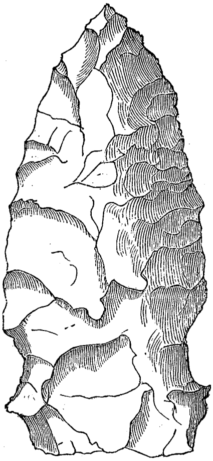
Fig. 64.



Natural size.

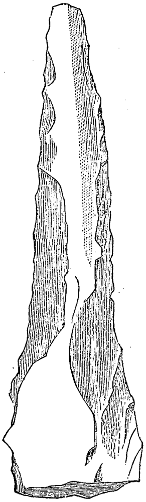
A third example of arrowhead exhibiting certain peculiarities is represented by Fig. 65. It has been frequently remarked that arrowheads, wherever found and of whatever age, all have very much in common; and if a collection from all quarters of the globe was to lose the labels, it would be a difficult matter to determine the locality of each, unless the mineral, from which they were made, would decide the question; and another interesting feature is the similarity between arrow, spear and harpoon points of an age long past and those now being used and made by the savages who are still more or less completely in their stone age. Bearing this in mind, we call attention to the "harpoonpoint," which in all important features is identical with one figured by Prof. Nilsson,* and concerning which he says, "the stone points (for harpoons) vary in shape; sometimes they are as in pl. iii, figs. 45, 47. Such are likewise found in Scania . . . . The broad head seems to indicate that they have been harpoons rather than arrowheads. . . . . It appears to me certain that pl. x, fig. 203 has been the stone point of an harpoon. . . . A person who had long resided in Greenland recognized it at once as such." Here we see that a New Jersey and an ancient Scandinavian specimen, and a Greenland one of the present day are identical. If breadth of the head of arrowpoints is an indication of use as harpoons, then several that we have figured must be placed under that heading; but while they have unquestionably sufficient breadth, as shown in Figs. 36 and 37 and 38 and 39, they have not a notched or other style of base, that would secure a firm fastening to the staff of the implement.

Fig. 65.



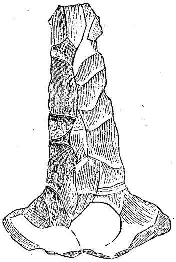
Natural size.

Fig. 66,



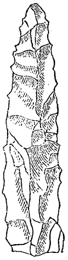
Natural size.

Fig. 67.



Natural size.

Fig. 68.



Nat. size.

In concluding the subject of "arrow heads," in this present paper, we desire to call attention to two other examples of specimens having a marked similarity to those figured by ethnologists in works devoted to "relics" of other countries. Prof. Nilsson, to whom we have so often referred, figures on plate xiii, figs. 225–226, two "arrowheads", which he refers to (page 88) as spears which have been worn down and broken from use, and repaired; and considers the specimens to have been once like others referred to, about six inches in length. Fig. 66, found here in New Jersey, is almost identical except in size, which is but one half that of the Scandinavian specimen. It seems not a little curious that not only do we find here pretty much all that characterizes the Scandinavian stone age, but even fragments that have been utilized are here found, showing that they, too, have undergone a similar restorative treatment.

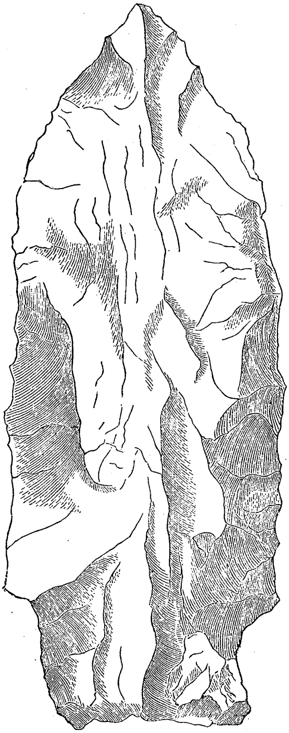
---

* Stone Age in Scandinavia, edited by Sir J. Lubbock; plate x, fig. 203; and page 28.

Figure 67 represents a handsomely chipped, rough-edged, bluntly pointed arrowhead; at least we will here follow Prof. Nilsson, and call them so, inasmuch as he has figured the same form, except, that they appear more roughly worked. He gives two figures that show the similarity better than a mere description can, on pl. ii, fig. 36, and pl. xvi, fig. 266. In size the specimens agree.

As, most frequently, stemmed arrows of any variety are in a fragmentary condition, we call attention to the illustration of a jasper arrowpoint (Fig. 68) which is perfect in itself and quite equals, in beauty of finish, any specimen of European flint chipping we have ever seen. There were certainly some very skilled arrow makers among our aboriginal, stone age people.

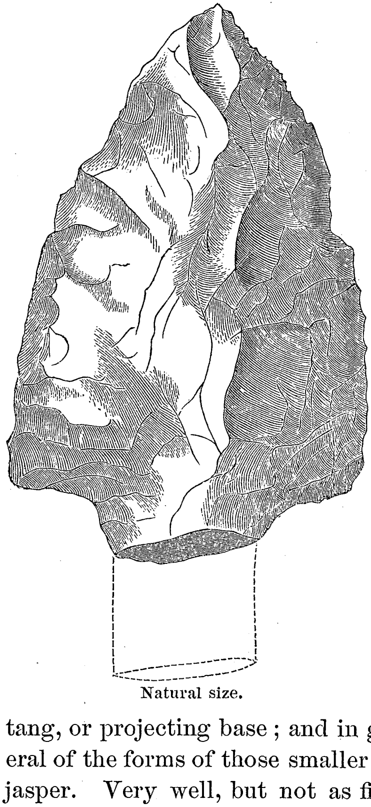
Fig. 69.



Natural size.

Taking a general survey of the collection of arrowheads that we have now studied in detail, one or two circumstances connected with them become evident and are worthy of comment. As a class, they are usually about one-third smaller than similar arrowpoints. as described and figured by various authors, from Europe especially, and, looking at them from a mineralogical point of view, we find that the majority are made of minerals that are not to be found anywhere in the neighborhood, or even in the state; and as they were unquestionably manufactured here, the minerals in bulk must have been transported from a distance. The large jasper hatchet (or lancehead, Fig. 22) was one of a hundred and fifty, all of which were cut from the same mass, and considering them to weigh eight ounces each, we have in them a bulk of stone not pleasant to carry as transportation was then effected—on men's backs probably. Indeed, near where these were discovered, was afterwards found a mass of the same mineral which was quite heavy but we cannot now recall the exact weight.

Fig. 70.

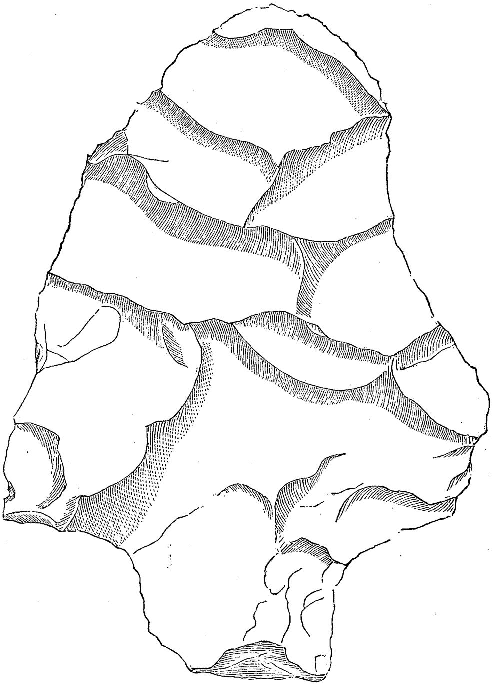


Natural size.

Spears. — There are to be found in almost every field, where arrowheads are ever met with, certain large specimens having all the general features of the preceding, but were unquestionably intended for other purposes. Such specimens we have designated "spears," a term which may or may not include "lances," as what we shall presently denominate a lance may really not have been so used. Fig. 69 represents a perfect specimen of the spear, it being, as are so many of the arrowheads, provided with the tang, or projecting base; and in general appearance resembles several of the forms of those smaller implements. This specimen is of jasper. Very well, but not as finely, cut are many arrowpoints; and it shows by its whole aspect to have been wrought out with a view to strength and durability, as well as being effective in the chase or in battle. The point and sides are still very sharp and capable of inflicting a fearful wound if thrust with a moderate amount of force. The specimen figured is three and three-quarters long by a little less than one-half in width. This size is about the average of the spears such as we are now describing.

Fig. 70 represents an allied yet much handsomer form, which is quite rare and so far has been always found (by us) in a fragmentary condition. It is simply an enlargement for spear purposes of a common form of arrowhead. The workmanship of this specimen excels that of the preceding, which may, however, be due to the greater tractability of the mineral. Like the other spear we have figured, this specimen as a hunting implement or weapon in war is very formidable. With the ordinary force of a man's arm, such a spearhead would impale a sturgeon, and thrown as a javelin would probably cleave a man's skull. The sharply barbed base would make this more efficacious in the chase than some of the European specimens figured by Prof. Nilsson, which, however, are usually somewhat larger. Sir John Lubbock figures a modern Esquimaux spearhead in "Prehistoric Times," fig. 218, which is very innocent looking in comparison with this.

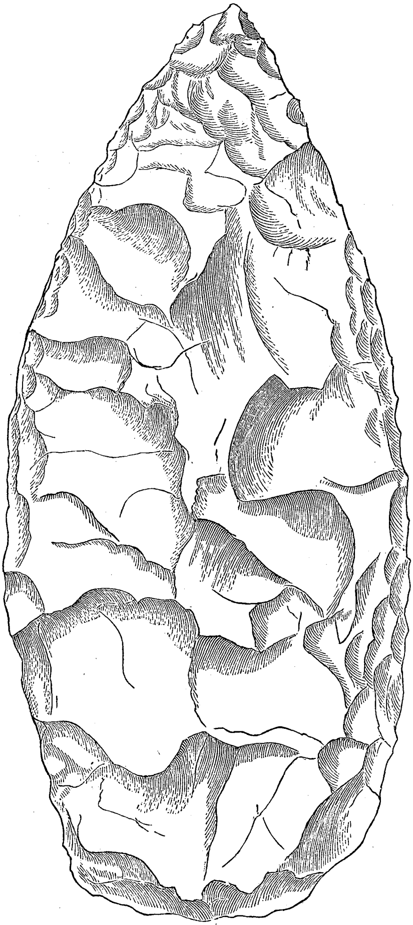
Fig. 71.



Natural size.

Judging from the abundance of stone implements that are made of a much less durable and easily wrought material than jasper, it would seem as though there was an ancient aristocracy, or at least, then, as now, there were two classes, a more wealthy, and a poorer one. Fig. 71 represents a very common, although invariably (so far) broken style of spearhead, differing somewhat from the preceding (Fig. 70), but closely allied, however, to it. This specimen is broader and has been longer. The base is merely a straight, narrow tang and suggests the base of the preceding, which we have represented as similar to this. The two specimens each supply to the other the missing parts, or at least suggest them. These three allied forms of true spears are not abundant. Probably they constitute about one per cent. of the "find" in any locality, except, perhaps, the sites of the former labors of arrow makers. Here fragments of spears abound in greater proportion. Their use rendered them more likely to become broken than arrowheads would be; and we now find that a much greater proportion of them are broken, notwithstanding their much greater strength. Possibly their size, rendering them more conspicuous, has led to their having been more frequently gathered up, years ago, when their shape and beauty made them attractive and curious, before they were considered of scientific value. We know of three beautiful specimens of large jasper spears that were picked up by the grandfather of their present owner over one hundred years ago. Indeed, if we had now in our possession one-half of the specimens we gathered and lost, when rambling about the country during summer vacations, the illustrations of this paper would be far more attractive.

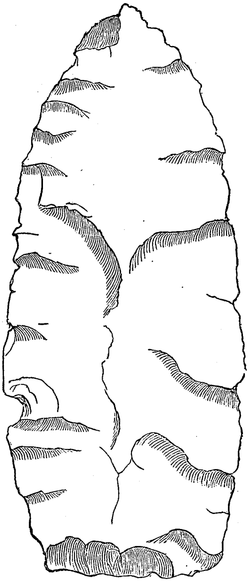
Fig. 72.



Natural size.

As we separated the arrowheads into two classes, those with projecting bases and those not so furnished, so we must also separate the spears. Fig. 72 is a beautiful specimen of a spearhead of a kind of flint, and mineralogically is unlike any other specimen in our collection. It is the leaf-form of arrowhead enlarged and is of fine workmanship. As a weapon it must have been valuable, but it is difficult to conceive how it could have been sufficiently securely attached to a long shaft. It is little less than five inches in length, by two and one-eighth in breadth. We have never met with another specimen that was like it in all particulars, size included, but have seen them in collections made elsewhere in the United States and in South America.

Fig. 73.



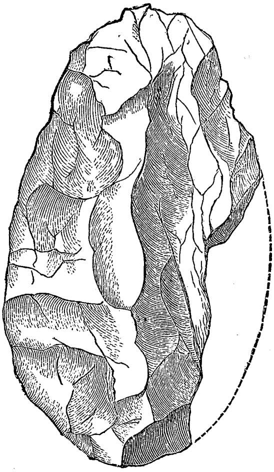
1-4 natural size.

Lanceheads.—Fig. 73 is a representative of an average specimen of those long, slender, finely edged slates, which we here denominate as "lanceheads." They are never wrought with that care which characterizes arrow and spearheads, but still have had sufficient care bestowed upon them to show that they were for some important purpose. They are very abundant, scattered promiscuously over the whole state, and turn up at odd times, every where and anywhere. Along the shores of our creeks and from the bottom of the Delaware River, upland and lowland, it seems to make no difference as to the character of the place, here or there, they are equally abundant. We cannot now remember how many specimens of them we included in a collection sent in the summer to London, but we believe that they, with the pile now before us, would number nearly a hundred. We have intimated that they were only of slate—this is not so. The "deposit" of which we have spoken already, of jasper specimens, of which the large hatchet figured was one, was composed of "lanceheads" very similar to this slate here figured. As all these "slate" specimens have a well defined, blunt base, we have thought that the handle or shaft must have been here attached, and if so, then we cannot look upon them as anything else than lances or javelins. The *majority* of "the jasper deposit" just referred to also had this same feature of a well defined base.

When such was not the case, we should call the specimen a hatchet. Specimens similar to these seem to be characteristic of "finds" in all parts of the globe. Our specimen certainly bears a strong resemblance to the Kjökkenmöddings lanceheads figured by Sir John Lubbock, after Worsaæ, in "Prehistoric Times," p. 230, figs 173, 174, 175. Our specimen is double the width and one-third longer, but we have met with some few that were identical in size with the illustrations quoted.

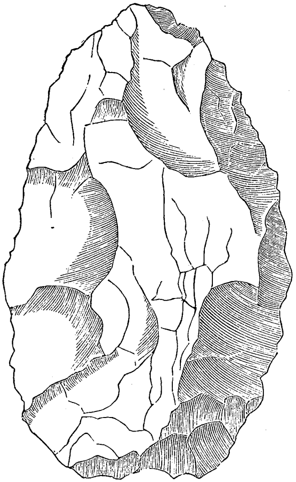
Knives.—Were the specimens (Figs. 74 and 75) found on the site of the former labors of an arrow maker, or were they but very rarely met with under any circumstances, we should be disposed to consider them as only worked jaspers that had been left unfinished and were probably commenced for arrowheads. Such, however, is not the case. Such specimens as these are scattered singly, say one or two to an acre, over all the ground that we have searched for antiquities; and although they vary materially from "flints" that have been designated "knives" by Nilsson and Lubbock, still we have come to the conclusion that as knives they were used. One consideration must here be borne in mind, that it is almost certain that there was scarcely a single instrument but had many uses, and as pocket knives are now frequently a combination of various tools, so the rudely chipped jaspers had

Fig. 74.



Natural size.

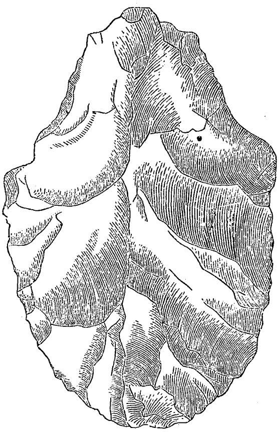
Fig. 75.



Natural size.

a multiplicity of uses. The edge being the prominent characteristic of the specimens, cutting must have been the principal object in the making, and therefore we call them "knives." Commenting on a collection of antiquities forwarded to him from this neighborhood, Sir John Lubbock remarks, "the absence of flakes and true scrapers surprises me. How do you account for it? Is there no flint in the neighborhood?" There is no flint in the neighborhood, and as jasper, slate and sandstone do not flake off as readily and conveniently as flint proper, so we do not have in the abundance characteristic of European "finds," *true* "flakes" and "scrapers" such as may have been made by almost a single blow; and so too, our knives, if those we have figured be knives, have not a smooth edge, as a single plane of cleavage produces, but still would surely be effective for most of the uses to which any "flint" knife could be put. The specimens are always of an elongated, oval outline, and vary little from three inches in length by one and one-half in width.

Fig. 76.

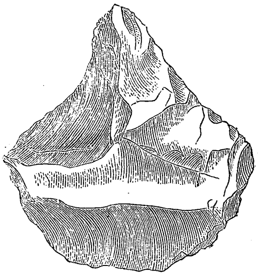


Natural size.

Both sides are equally smoothly chipped. In some specimens, indeed in quite a large number, there is more of a curve to one side than the other, approaching in this the general appearance of the semi-lunar knives found in Sweden. (See Nilsson's "Stone Age," plate v, figs. 88–9.) Figure 75 shows this more, perhaps, than any other specimen in our collection. Mr. Lubbock has figured in "Prehistoric Times" (page 490, fig. 214), an Esquimaux knife, that certainly can be duplicated without difficulty, *without the handle.* Many of the more elongated leaf-shaped arrows, that had lost their points, might have been thus used, by placing the broken end in a bone handle and so converting the base and sides into the edges of a knife blade. As we do not often find arrowheads which give evidence of having been repointed, perhaps very many of the specimens now found without points were once inserted into bone handles, which latter have long since crumbled into dust.

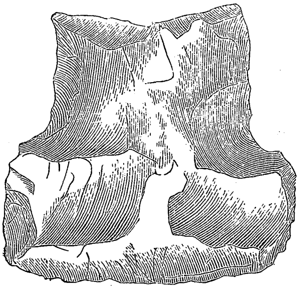
SCRAPERS.—Every collection of flint implements found in Europe seems to have always a large number of rude implements that have been called "scrapers:" viz., tools for scraping and cleaning raw skins of animals, which were afterwards to be converted into clothing. Prof. Nilsson, besides these "scrapers," describes a "stretching implement," which may or may not be represented here by certain carefully cut jasper specimens, which we will refer to presently. Specimens that we here figure as scrapers (Figs. 76 and 77) approach somewhat to the figures and descriptions of Nilsson and Lubbock, but do not agree wholly with either. Fig. 76 will be found somewhat similar to the illustration in Nilsson's work, plate ix, fig. 188. It will be noticed, however, as in all our New Jersey specimens, that both sides are chipped. Specimens such as this and those following were sent to Sir J. Lubbock, who expresses surprise at the absence (in the collection) of "true" scrapers. Admitting the dissimilarity between the European and the American specimens, we still claim for ours greater beauty of finish and fully as great adaptation to the use intended.

Fig. 77.



Natural size.

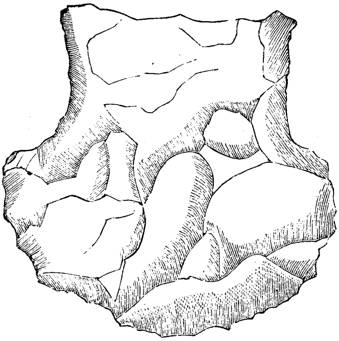
Fig. 78.



Natural size.

"Stretching Implements."—Prof. Nilsson calls by this name certain forms of stone implements, which he says resemble greatly "the bone implement, provided with a handle, which is there used for stretching the skins in order to give them the requisite softness." The figure that he gives is represented with a *sharp* edge, but he says, in the body of the work, that "the widened part, representing the edge, has been *rounded* off by *constant wear*, probably from being rubbed against leather or something of that kind." ("Stone Age in Scandinavia," p. 77.) The widened part of our specimens (Figs. 78 and 79) are not worn smooth in one sense but the ridges are not acute enough to endanger the leather by cutting, and we can readily see that, provided with a handle, they would be well adapted to the use he mentions with reference to Scandinavian specimens. One argument in favor of these specimens being used for domestic purposes, is that we have found them numerous in certain localities, where the large number of fragments of pottery, "corncrushers," pestles, etc., shows that on that spot once was a dwelling or village of those ancient people who utilized the "relics" that we have been describing. As to their manufacture, we have but to remark that they appear to have been made from the mineral directly, and not from the bases of broken spearheads, our reason being that they are generally thicker and wider than spearheads; though, on reference to the spearhead (Fig. 69), it will be seen that the basal third of this specimen would make a "stretcher" very similar to the one we have figured here, 79. These stretchers or skin dressers are quite abundant. From one field of but eight or ten acres we have over seventy specimens, all agreeing remarkably in size and shape, and, with one exception, all are cut from jasper.

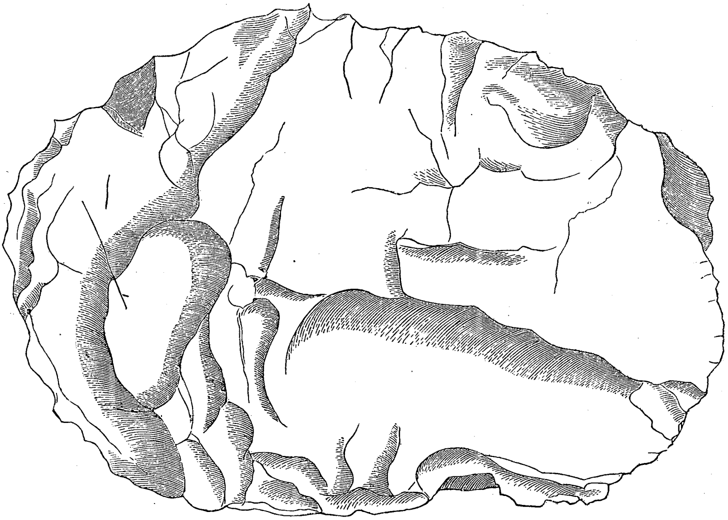
Fig. 79



Natural size.

Somewhat allied to scrapers, hatchets; and in a measure *sui generis*, is the next illustration we shall give. The specimen itself is a light yellow jasper "flake," subsequently chipped about its edges. If a "hatchet" handle were attached to the centre of the flatter side, or base, the stone would then make a comparatively good double edged axe or hatchet. If, however, a short bone handle had covered the straight side or base, then the specimen could have been used as a knife, or "skinner," although now its edge is too irregular and dull for skinning. When sharper, however, it could have been utilized in detaching the tough hide of the bison or a deer; but whether or not the bison ever roamed in New Jersey, we know not. Lubbock figures as "flint implements," a series of specimens taken from a tumulus at West Kennet, Eng., (Prehistoric Times, p. 153, figs. 147-50;) and to his figure 150 our specimen certainly bears great resemblance. As Sir John Lubbock does not give any other name to the specimens, nor suggest their probable particular use; we can only follow his example, as to figure 80, and call it an "implement." This certainly is an easy, but scarcely satisfactory way of escaping a trouble, which perhaps is little bettered by the suggestion that just such a chipped flint may not, by its original owner, have been specially set apart for particular use or uses, but have been a sort of "handy come-by," valuable to crush a mussel, or crack a marrow bone, but never designated by its first possessor, as either the one or the other. Indeed, would not a people whose advancement was but thus far progressed—a stone-age people—be limited in the variety of implements, and adepts in the art of multiplying uses for a single simple article?

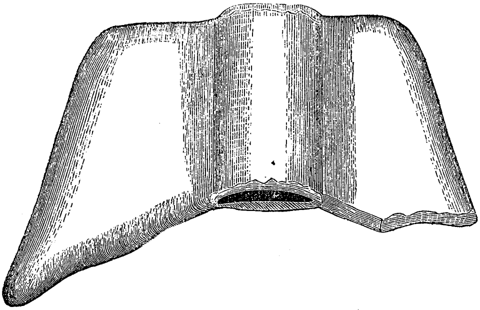
Fig. 80.



Natural size.

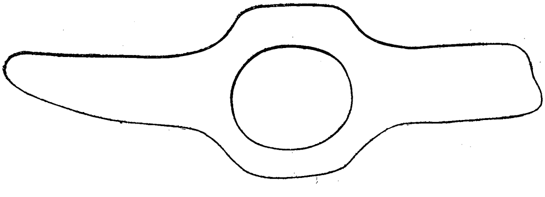
Perforated Stones.—In the fourth volume of the American Naturalist, page 380, we have described and figured a curiously formed "relic" found near Trenton. We now know that they are frequently found in the west, and since the publication of the notice of our Jersey specimen, a figure of an allied carved stone, from Vermont, has been published on page 16, of the fifth volume (1871). Figs. 81, 81*a*, is an ornament or "gorget" (Squier and Davis) found in the same field with the specimen we have referred to (Amer. Nat. page 380, 1870). It is of softer material and perhaps not as finely finished as some similar specimens; but the hole that runs the whole length of the specimen is as perfect as any drilling in metal that we have ever seen. The width of the specimen in the centre is just one inch. The breadth at the top one and one-half inches. As in the specimen figured in the NATURALIST for March, 1871, p. 15, this has, also, the perforation slightly smaller at the apex than at the base. Another perforated stone is the elongated, quadrangular flat stone (Fig. 82). This specimen has been carefully polished and is very graceful in outline. The perforation near one end — the smaller — is evenly drilled from each side to the centre, where the two depressions meet in an opening one-third the diameter of the drilling at the surface. The use is perhaps a matter of doubt, but the perforation suggests that it was suspended by a cord, probably around the neck. It has been suggested that it was used as an "ear drop."

Fig. 81.



Natural size.

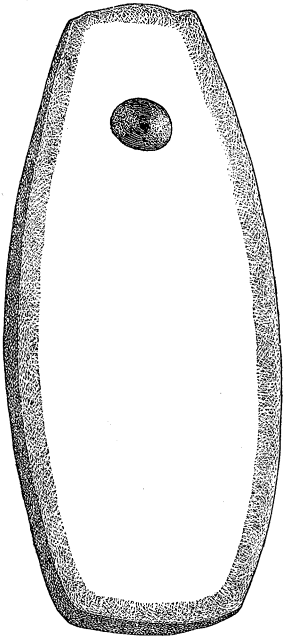
Fig. 81 *a*.



Section.

FISHING-PLUMMETS. — Girdled, globular or oval pebbles, which have been designated "fishing-plummets," are very abundant. We

Fig. 82.

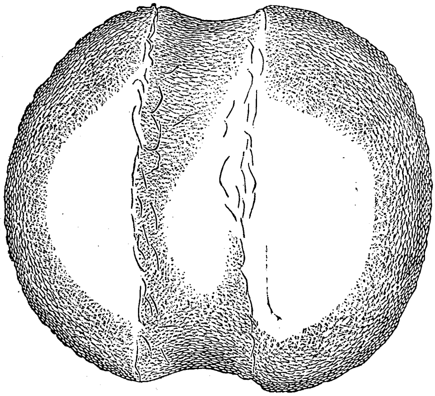


Natural size.

have never met with any having more than the one groove each, as Prof. Nilsson describes. Indeed, one of his specimens he mentions as coming from the Delaware River, Pennsylvania; and as ours (Fig. 83) was picked up from the shore of that river, *they may have belonged to the same net!* While the fact of the vast majority of these stones being found in the beds of rivers or on the immediate shores would naturally suggest the use now attributed to them, still very many are found upland far from any water at present; so that they may have had some other use than net weights, or have been lost in the transportation of nets overland.

Pottery.—As we have nothing but fragments to offer, we will close our extended notice of "Indian antiquities" with a few words concerning these specimens (Figs. 84, 85, 86, 87). In the style of decoration, these will be seen to vary. On examining a vast quantity of such fragments, we find no other forms of ornamentation, but frequently a combination of two, three or all of these forms. Fig. 84 is part of the top of an urn or vase, and the rim, as distinct from the sides of the vessel, is well shown. On comparison with fragments figured by Sir John Lubbock, in "Prehistoric Times" (page 154, figs. 151–4), we find that the New Jersey specimens are not greatly dissimilar and are quite as handsome.

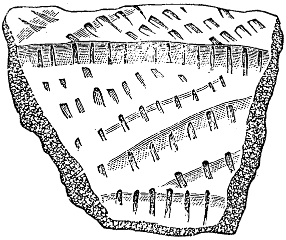
Fig. 83.



Natural size.

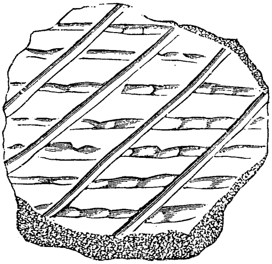
To what extent the "aborigines" were vegetarians, or were adepts in gastronomic science, it is difficult now to determine; but besides the vast quantity of fragments of pottery, there are frequently to be found, long, cylindrical stones, with tapered and polished ends, that for want of a better name, perhaps, are entitled "pestles." They are too well known to need a figure given of any specimen, and their whole extent of variation is in length and diameter. The largest we have ever seen is in the possession of Dr. John W. Ward of Trenton, and was found near that place. It is seventeen and one-half inches in length, and scant eight inches in circumference. It is bevelled at either end and polished; indicating that the ends were used in crushing corn (?) by striking blows, rather than by rolling the pestle in the depression of a basin-shaped stone. Very many of these pestles are less uniform in their circumferences, being nearer an ovoid cylinder in shape than truly cylindrical, and again, some specimens we have gathered, have a somewhat polished surface at the middle, showing that the usual contact was there, rather than at the ends.

Fig. 84.



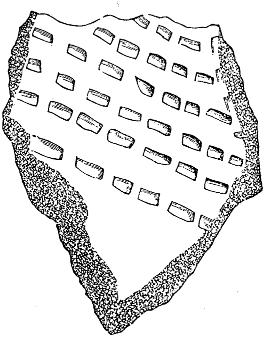
Natural size.

Fig. 85.



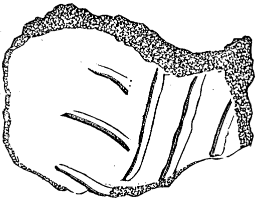
Natural size.

Fig. 86.



Natural size.

Fig. 87.



Natural size.

Very many of these "pestles" are of diminutive size, varying from three to seven inches, and of diameter in proportion. Their use is plainly indicated by the occasional presence of a shallow mortar; a circular flat stone, in the centre of which is a depression that has been gradually worn by the constant rubbing action of the little pestle. Their use was unquestionably to prepare the paint used in the decoration of the face and body. Indeed, one specimen of such mortar and pestle, exhumed with a skeleton and some weapons, had a hard cake of reddish clay filling up the depression of the mortar, which was the more easily recognizable, as the surrounding earth was of a peculiar blue-black color, being an admixture of the surface loam and underlying blue triassic clay that is so abundant in the neighborhood of Trenton, New Jersey.

Of other implements belonging to our prehistoric kitchens, there is but little to be said, except of certain large, saddle-shaped stones that are claimed to have been used as the "mills" whereat, by the use of large pestles, maize was crushed before being used as food. Certainly several such stones as we refer to were admirably adapted for just such use; and we doubt not that to consider them as corn-mills is correct. They have invariably been too unwieldy to move from the fields for purposes of illustration; and in fact have varied so in shape, that no one illustration would give a general idea of the whole set.

The same remarks will apply to other large stones, that appear to have been utilized by the Redman, and are called "anvils," for want of a more correct designation. Dr. Thomas S. Stevens of Trenton, to whom we are indebted for many favors, has called our attention to one such anvil, which was found on the site of an "Indian" village. The stone in question is about twenty inches in height; has an hour-glass contraction at the middle, and has a level, circular surface at either end of about nine inches in diameter. Where contracted at the middle, it measures about five or six inches in diameter. The present shape of the stone, we found on trial to be admirably adapted for use as an anvil, or "bench;" by placing it before you, between the legs, and seating yourself upon the ground. Thus positioned, one could easily imagine himself a prehistoric arrow maker, resting one surface of a block of jasper upon the upper face of the anvil, and striking off the precious flakes, that a subsequent laborious chipping would transform to such delicate arrowheads as we have figured. Whether such an anvil as here described, was shaped from a globular boulder or not, is a very difficult question to decide; but judging from the mineralogical character of the implement, we consider that it originally had some resemblance to its present shape, and was afterwards chipped to perfect the uniformity of its hour-glass contraction.

We have now described typical specimens of our collection. It must be borne in mind, that they are all from one limited locality, except one axe, and that collectors may now have or may discover within state limits much that we have not seen. We may add to our own collection as the years roll by; but notwithstanding all this, we believe that the ground has been sufficiently gone over to warrant us in heading our article, the Stone Age in New Jersey.

NOTE.—Since the original manuscript of this article was written I have had an opportunity of seeing "Hæckwelder's Narrative;" and this missionary there states, that the New Jersey bank of the Delaware River, from Trenton to Bordentown, was occupied by a "great king" to whom the many lesser chiefs were subservient. This fact may explain why this locality is so singularly rich and varied in its forms of antiquities. May not the surrounding tribes have brought hither, as tribute, tithes of their choicest weapons, and thus explain why so many specimens of weapons of foreign minerals are gathered in the fields, which possess *naturally* none of the minerals of which so many of these implements, are made? As Hæckwelder was one of the earliest Europeans visiting these parts, his account is well worth referring to, whether our assumption be correct or not. It is interesting to know that the locality of which we have treated, was once a place of importance to the people whose scattered *relics* alone are left for us to study them by.

REVIEWS AND BOOK NOTICES.

SIEBOLD'S PARTHENOGENESIS.* Professor Von Siebold, well known by his first work on the Parthenogenesis of the bees and silk worm (*Bombyx mori*) gives here further statements of a similar development in *Polistes*, *Vespa holsatica*, *Nematus ventricosus*, *Psyche helix*, *Solenobia triquetrella* and *lichenella*, *Apus cancriformis* and *productus*, *Artemia salina* and *Limnardia Hermanni*. The facts reported are the results of observations, continued through a dozen or more years. The manner of observation, and the statement of the facts are equally interesting and important. They form a masterpiece and indeed a standard for every zoologist desirous of knowing how to observe and how to study. There are twenty-one observations concerning Apus reported from the years 1857 to 1869 at four different localities, in Bohemia, Croatia, Poland and Italy. The number of collected and investigated specimens for each observation varying between 21, 100, 500, 1000 and even 5796! Males were found only in Krakau, Breslau and Croatia. In Bavaria, near Gossberg, Siebold did not

---

* Beiträge zur Parthenogenesis der Anthropods von. C Th. E. v. Siebold. Leipzig. 1871. pp. 238, pl. 2.